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(54) **Air bag device**

Airbagvorrichtung

Dispositif de sac de sécurité gonflable

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- **PATENT ABSTRACTS OF JAPAN vol. 017, no. 018 (M-1352), 13 January 1993 (1993-01-13) & JP 04 244453 A (NISSAN MOTOR CO LTD), 1 September 1992 (1992-09-01)**
- **PATENT ABSTRACTS OF JAPAN vol. 014, no. 110 (M-0943), 28 February 1990 (1990-02-28) & JP 01 311930 A (NIPPON PLAST CO LTD), 15 December 1989 (1989-12-15)**
- **PATENT ABSTRACTS OF JAPAN vol. 016, no. 111 (M-1223), 18 March 1992 (1992-03-18) & JP 03 281460 A (MAZDA MOTOR CORP), 12 December 1991 (1991-12-12)**
- **PATENT ABSTRACTS OF JAPAN vol. 017, no. 507 (M-1479), 13 September 1993 (1993-09-13) & JP 05 131889 A (TOYOTA MOTOR CORP), 28 May 1993 (1993-05-28)**

EP 1 044 855 B1

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Description

BACKGROUND OF THE INVENTION

Field of the Invention:

[0001] The present invention relates to an air bag device, and particularly to an air bag device according to the preamble of the patent claim 1 provided in vehicles such as automobiles and expanding to unfold in an interior of the vehicle so as to protect a vehicle occupant.

Description of the Related Art:

[0002] Heretofore, an example of an air bag device provided in vehicles such as automobiles and expanding to unfold in an interior of the vehicle so as to protect a vehicle occupant has been disclosed in Japanese Utility Model Application Laid-Open (JP-U) No. 3-52265.

[0003] In an air bag device as shown in Fig. 6, an air bag body 70 is formed so as to have a double structure comprised of an inner air bag body 72 and an outer air bag body 74. A large vent hole 76 is formed in the outer air bag body 74 and a small vent hole 78 is formed in the inner air bag body 72. The vent hole 76 formed in the outer air bag body 74 is provided with a lid 80. The lid 80 closes the vent hole 76 until expansion (unfolding) of the outer air bag body 74 is substantially completed, and the lid 80 opens the vent hole 76 after the expansion of the outer air bag body 74 has been substantially completed. As a result, in a case in which a vehicle occupant abuts against the air bag body 70 after the expansion of the outer air bag body 74 has been substantially completed, reaction force is applied from the air bag body 70 to the vehicle occupant, and the vehicle occupant is protected.

[0004] In the above-described air bag device, as shown in Fig. 6, the small vent hole 78 is formed in the inner air bag body 72 and the large vent hole 76 is formed in the outer air bag body 74. Therefore, the quantity of gas which is allowed to pass through the vent holes 76 and 78 cannot be controlled in accordance with a physical constitution of a vehicle occupant abutting against the air bag body 70. As a result, in the air bag device shown in Fig. 6, reaction force applied from the air bag body 70 to the vehicle occupant when the vehicle occupant abuts against the air bag body 70 is made most suitable only for a vehicle occupant of a standard (average) physical constitution.

[0005] The document JP 04244453 A, which is the closest prior art with respect to the subject-matter of the invention, discloses an air bag device having an air bag body, which unfolds in an interior of a vehicle, said air bag body comprises an outer air bag body and an inner air bag body having a capacity smaller than that of the outer air bag body and unfolding in an interior of the outer air bag body. The outer air bag body includes at least one first whole formed therein, and the inner air bag

body includes communication means which is formed at least on a facing surface thereof substantially facing a vehicle occupant at the time of unfolding the air bag body. The communication means is provided to allow communication between an interior of the inner air bag body and a space formed between the inner air bag body and the outer air bag body.

[0006] Additionally, from the document JP 013111930 A a gas bag is known, which consists of an outer gas bag and an inner gas bag in double construction and each base end part is joined so as to be installed at an opening part of a gas generator. A gap between the central parts of these gas bags at the driver's side is partially closed by connecting pieces arranged in ring with predetermined spaces. The inner gas bag is provided with gas ventilation small holes at its central part and with gas ventilation large holes at its outer peripheral part.

SUMMARY OF THE INVENTION

[0007] In view of the above-described facts, an object of the present invention is to provide an air bag device in which proper reaction force corresponding to a physical constitution of a vehicle occupant abutting against an air bag body can be generated.

[0008] In accordance with a first aspect of the present invention, there is provided an air bag device having an air bag body which expands to unfold in an interior of a vehicle, the air bag body comprising: an outer air bag body having vent holes communicating with an exterior of the air bag body; and an inner air bag body having a capacity smaller than that of the outer air bag body and unfolding in an interior of the outer air bag body, wherein the inner air bag body is formed so as to have a high gas permeability, and when a vehicle occupant abuts against the outer air bag body, a portion of the outer air bag body pressed by the vehicle occupant abuts the inner air bag body so as to control a quantity of gas flowing from the inner air bag body into the outer air bag body.

[0009] Accordingly, in a case in which the vehicle occupant abuts against the outer air bag body after the air bag body has unfolded, a portion of the outer air bag body pressed by the vehicle occupant abuts the inner air bag body and the quantity of gas flowing from the inner air bag body into the space formed between the inner air bag body and the outer air bag body is controlled. As a result, the quantity of gas flowing from the inner air bag body to the outer air bag body changes in accordance with a physical constitution of the vehicle occupant abutting against the air bag body, and the quantity of gas escaping from the vent holes of the outer air bag body to an exterior of the air bag body also changes due to the same reason. Namely, in a case in which a small-built vehicle occupant abuts against the outer air bag body, an area of a portion at which the outer air bag body and the inner air bag body abut each other is small and a region of the inner air bag body through which gas is allowed to pass becomes wide. Therefore, the quan-

tity of gas flowing from the inner air bag body into the space between the inner air bag body and the outer air bag body increases and the quantity of gas escaping from the vent holes of the outer air bag body to an exterior of the air bag body also increases. As a result, it is possible to prevent reaction force, which is applied from the air bag body to the vehicle occupant when the vehicle occupant abuts against the air bag body, from unnecessarily becoming large (from becoming larger than desired one). On the other hand, in a case in which a largely-built vehicle occupant abuts against the outer air bag body, an area of a portion at which the outer air bag body and the inner air bag body abut each other is large and a region of the inner air bag body through which gas is allowed to pass becomes smaller. Therefore, the quantity of gas flowing from the inner air bag body into the space between the inner air bag body and the outer air bag body decreases and the quantity of gas escaping from the vent holes of the outer air bag body to an exterior of the air bag body also decreases. As a result, it is possible to prevent reaction force, which is applied from the air bag body to the vehicle occupant when the vehicle occupant abuts against the air bag body, from unnecessarily becoming smaller (from becoming smaller than desired one). In other words, suitable reaction force can be generated correspondingly to the physical constitution of the vehicle occupant abutting against the air bag body.

[0010] Further, according to a second aspect of the present invention, in the air bag device provided by the first aspect, the inner air bag body is made of a cloth material having a large number of vent holes formed therein.

[0011] Accordingly, in addition to the structure provided by the first aspect of the present invention, it suffices that a large number of vent holes be formed in an inner air bag body. As a result, suitable reaction force can be generated by a simple structure so as to correspond to the physical constitution of the vehicle occupant abutting against the air bag body.

[0012] In accordance with a third aspect of the present invention, in the air bag device provided by the first aspect, the inner air bag body is made of a cloth material having a high gas permeability.

[0013] Accordingly, in addition to the structure provided by the first aspect of the present invention, it suffices that an inner air bag body be made of a cloth material having a high gas permeability. As a result, suitable reaction force can be generated by a simple structure so as to correspond to the physical constitution of the vehicle occupant abutting against the air bag body.

[0014] Still further, in accordance with a fourth aspect of the present invention, the inner air bag body includes communication means which is formed at least on a facing surface thereof substantially facing a vehicle occupant at the time of unfolding the air bag body, the communication means being provided to allow communication between an interior of the inner air bag body and a

space formed between the inner air bag body and the outer air bag body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a plane cross sectional view showing an air bag device according to an embodiment of the present invention.

Fig. 2 is a perspective view showing the air bag device according to the embodiment of the present invention when seen from a vehicle-interior side and also diagonally from a rear side of a vehicle.

Fig. 3A is a drawing for illustration of an operation in a case in which a small-built vehicle occupant abuts against the air bag device according to the embodiment of the present invention, and Fig. 3B is a drawing for illustration of an operation in a case in which a largely-built vehicle occupant abuts against the air bag device according to the embodiment of the present invention.

Fig. 4 is a perspective view when seen diagonally from the rear side of a vehicle, illustrating a vehicle-interior front side of the vehicle to which the air bag device according to the embodiment of the present invention is applied.

Fig. 5 is a perspective view showing an air bag device according to a modified example of the embodiment of the present invention when seen from a vehicle-interior side and also diagonally from a rear side of a vehicle.

Fig. 6 is a side cross sectional view which shows a conventional air bag device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] An air bag device according to an embodiment of the present invention will be hereinafter described with reference to Figs. 1 to 4.

[0017] Note that arrows "UP", "FR", and "IN" shown in the drawings respectively represent: the upward direction of a vehicle; the forward direction of the vehicle; and an inward direction of the vehicle relative to a transverse axis thereof.

[0018] As illustrated in Fig. 4, an air bag device 10 according to the present embodiment is disposed at a steering wheel 12 and is provided as an air bag device for a driver's seat in which an air bag expands in a front region of a vehicle occupant 16 seated at a driver's seat 14 so as to protect the vehicle occupant 16.

[0019] As illustrated in Fig. 1, the air bag device 10 is equipped with an air bag body 18 and an inflator 20. The inflator 20 is fixed via a base plate (not shown) to a hub provided at a core bar of the steering wheel 12 (see Fig. 4) and is mounted inside the steering wheel 12.

[0020] A flange 26 is formed at an intermediate por-

tion of the inflator 20 in the axial direction so as to extend outward in a radial direction of the inflator 20. The flange 26 is fixed to the base plate by a bolt (not shown).

[0021] An actuating device, a detonator, a booster, a gas generating material, a filter, and the like (which are all not shown) are accommodated within the inflator 20. The actuating device operates to cause the detonator to ignite, and the gas generating material is burnt via the booster. As a result, a large quantity of gas can be generated within the inflator 20.

[0022] A portion of the inflator 20 which faces a vehicle occupant (that is, a lower portion of the inflator 20 in Fig. 1) is formed as a gas blowout portion 28. A plurality of circular gas blowout holes 30 are formed on a peripheral surface of the gas blowout portion 28 at predetermined intervals. Gas generated within the inflator 20 is blown out from the gas blowout holes 30 outside the inflator 20.

[0023] An air bag body 18 is accommodated in a folded manner at a vehicle-occupant side of the inflator 20 (at the lower side of the inflator 20 on the paper of Fig. 1), and the air bag body 18 expands to unfold due to pressure of gas from the inflator 20.

[0024] As shown in Fig. 2, the air bag body 18 is formed as a double structure comprised of a large-capacity outer air bag body 32 which forms an outer side of the air bag body 18, and a small-capacity inner air bag body 34 which forms an inner side of the air bag body 18.

[0025] As shown in Fig. 1, an outer peripheral edge 32A of the outer air bag body 32 is fixed to the flange 26 of the inflator 20 by fixing members 36 such as bolts. A circular opening 38 is formed in the outer air bag body 32 so as to correspond to the inflator 20, and the gas blowout portion 28 of the inflator 20 passes through the circular opening 38.

[0026] An outer peripheral edge 34A of the inner air bag body 34 is fixed by stitching or the like to a connecting portion 32B of the outer air bag body 32 apart from the outer peripheral edge 32A by a predetermined distance. The inner air bag body 34 is formed so as to have a high gas permeability. Specifically, the inner air bag body 34 is formed of a cloth material 42 in which a large number of vent holes 40 are provided, and gas blown out from the inflator 20 is allowed to pass through the vent holes 40. Accordingly, when the air bag body 18 unfolds, first, the inner air bag body 34 and the outer air bag body 32 expands to unfold due to the gas from the inflator 20 (indicated by arrow W in Fig. 1) substantially in an integrated manner. After the inner air bag body 34 has completely unfolded, gas flowing through the vent holes 40 causes the outer air bag body 34 to further expand to unfold. As a result, the air bag body 18 is finally brought into a state of expanding to unfold to form a double structure shown in Fig. 1.

[0027] On the other hand, when a vehicle occupant abuts against the outer air bag body 32, as shown in the two-dot chain lines in Fig. 1, a region of the outer air bag

body 32 pressed by the vehicle occupant abuts a portion of the inner air bag body 34 and some of the vent holes 40 formed in the inner air bag body 34 are closed. As a result, the quantity of gas flowing from the inner air bag body 34 into a space 48 formed between the outer air bag body 32 and the inner air bag body 34 can be controlled.

[0028] A vent hole 46 communicating with an exterior of the air bag body 18 is formed at each of positions in both side portions of the outer air bag body 32 (that is, in both ends of the outer air bag body 32 in the transverse direction of a vehicle at the time of the unfolding), the each of the positions is located nearer toward the vehicle occupant than the connecting portion 32B (which positions are each located at the lower side of the connecting portion 32B in Fig. 1). Accordingly, gas flowing through the vent holes 40 and into the space 48 between the outer air bag body 32 and the inner air bag body 34 is allowed to escape outside the air bag body 18 via the vent holes 46.

[0029] One end 50A of each of band-shaped straps 50 is fixed by stitching or the like at a portion 34B of the inner air bag body 34 substantially facing the corresponding vent hole 46. Another end 50B of each strap 50 is fixed to the flange 26 of the inflator 20 in such a manner as to be fastened together with the flange 26 by a fixing member 36 such as a bolt. When the air bag body 18 is brought into an unfolding state (see Fig. 1), these straps 50 each stretch to its full length (the state shown in Fig. 1). Therefore, there is little possibility that the inner air bag body 34 abuts against peripheries of the vent holes 46 formed in the outer air bag body 32 so as to prevent the gas, which flows into the space 48 between the outer air bag body 32 and the inner air bag body 34, from escaping outside the air bag body 18 via the vent holes 46.

[0030] Next, an operation of the present embodiment will be described.

[0031] In the present embodiment, when a vehicle rapidly decelerates, the actuating device of the inflator 20 operates to cause the detonator to ignite, and the gas generating material is burnt via the booster. As a result, a large quantity of gas is generated within the inflator 20. The gas generated within the inflator 20 is blown out from the gas blowout holes 30 so as to expand to unfold the air bag body 18. Fragments or the like produced during the combustion are removed by the filter. In this case, the inner air bag body 34 and the outer air bag body 32 of the air bag body 18, first, expand to unfold substantially in an integrated manner due to the gas from the inflator 20 (indicated by arrow W in Fig. 1). After the inner air bag body 34 has completely unfolded, the gas flowing through the vent holes 40 causes the outer air bag body 32 to further expand to unfold. As a result, the air bag body 18 is finally brought into a state of expanding to unfold to form the double structure shown in Fig. 1.

[0032] Next, as indicated by the two-dot chain lines in

Fig. 1, when the vehicle occupant abuts against the completely unfolded air bag body 18, an abutting portion 32C of the outer air bag body 32 pressed by the vehicle occupant abuts against a portion of the inner air bag body 34 (an abutted portion), and the vent holes 40 disposed in the abutted portion of the inner air bag body 34 against which the abutting portion 32C pressed by the vehicle occupant abuts are closed. Therefore, the quantity of gas flowing from the inner air bag body 34 into the space 48 is controlled (restricted). As a result, the quantity of gas flowing from the inner air bag body 34 into the space 48 changes in accordance with a physical constitution of the vehicle occupant 16 abutting against the outer air bag body 32, accordingly, the quantity of gas escaping from the vent holes 46 of the outer air bag body 32 outside the air bag body also changes.

[0033] In other words, as shown in Fig. 3A, in a case in which a small-built vehicle occupant abuts against the outer air bag body 32, an area of the abutting portion 32C of the outer air bag body 32 on the inner air bag body 34 (indicated by the slanting lines in Fig. 3A) is small and the number of vent holes 40 closed by the abutting portion 32C is also small. Therefore, there remains a wide region in which gas is allowed to flow through, that is, there remains a large number of vent holes 40 through which gas is allowed to flow. As a result, the quantity of gas flowing from the inner air bag body 34 into the space 48 increases and the quantity of gas escaping from the vent holes 46 of the outer air bag body 32 outside the air bag body also increases, and therefore, reaction force applied from the air bag body to the vehicle occupant when the vehicle occupant abuts against the outer air bag body 32 does not become large.

[0034] On the other hand, as shown in Fig. 3B, in a case in which a largely-built vehicle occupant abuts against the outer air bag body 32, an area of the abutting portion 32C of the outer air bag body 32 on the inner air bag body 34 (indicated by the slanting lines in Fig. 3B) is large and the number of vent holes 40 closed by the abutting portion 32C is also large. Therefore, a region through which the gas is allowed to flow becomes small, that is, the number of vent holes 40 through which gas is allowed to flow decreases. As a result, the quantity of gas flowing from the inner air bag body 34 into the space 48 decreases and the quantity of gas escaping from the vent holes 46 of the outer air bag body 32 to an exterior of the air bag body also decreases, and therefore, reaction force applied from the air bag body to the vehicle occupant when the vehicle occupant abuts against the outer air bag body 32 does not become small.

[0035] Accordingly, in the air bag device of the present embodiment, suitable reaction force corresponding to the physical constitution of a vehicle occupant abutting against the air bag body 18 can be generated.

[0036] In the present embodiment, as illustrated in Fig. 1, the end 50A of each strap 50 is fixed to the portion 34B of the inner air bag body 34 substantially facing the

vent hole 46, and therefore, there is little possibility that the inner air bag body 34 abuts against peripheries of the vent holes 46 formed in the outer air bag body 32 so as to prevent the gas flowing into the space 48 from escaping from the air bag body 18 via the vent holes 46.

[0037] Further, in the present embodiment, the inner air bag body 34 is made of the cloth material 42 in which a large number of vent holes 40 are formed, and therefore, suitable reaction force which corresponds to the physical constitution of a vehicle occupant abutting against the air bag body 18 can be generated by a simple structure.

[0038] In the foregoing, while the present invention has been particularly shown and described in detail with reference to one preferred embodiment, it will be understood by those skilled in the art that various modifications may be made within the spirit and scope of the invention. For example, the above-described embodiment is provided such that the inner air bag body 34 is made of the cloth material 42 in which a large number of vent holes 40 are formed, but as shown in Fig. 5, the inner air bag body 34 may be made of a meshed (coarsely woven) cloth material 54 as the cloth material having a high gas permeability.

[0039] Further, in the above-described embodiment, the air bag device of the present invention is applied to the air bag device 10 for a driver's seat, which is provided to unfold in a region at the front side of the vehicle occupant 16 seated in the driver's seat 14. However, the air bag device of the present invention can also be applied to an air bag device 64 for a front passenger's seat, which is provided to unfold in a region at the front of a vehicle occupant 62 seated in a front passenger's seat. Moreover, the air bag device of the present invention can be applied to other various air bag devices, for example, a side air bag device in which an air bag body accommodated along a front pillar and a roof side rail expands to unfold along a side portion of the interior of a vehicle similarly to a curtain or in a tubular form, a side air bag device in which an air bag body accommodated in a seat or in a side door expands to unfold along an vehicle-interior side portion of the side door, and the like.

[0040] The present invention discloses an air bag device having an air bag body which expands to unfold in an interior of a vehicle, the air bag body comprising: an outer air bag body having vent holes communicating with an exterior of the air bag body; and an inner air bag body having a capacity smaller than that of the outer air bag body and unfolding in an interior of the outer air bag body, wherein the inner air bag body is formed so as to have a high gas permeability, and when a vehicle occupant abuts against the outer air bag body, a portion of the outer air bag body pressed by the vehicle occupant abuts the inner air bag body so as to control a quantity of gas flowing from the inner air bag body into the outer air bag body.

[0041] Accordingly, there is an excellent effect in that suitable reaction force which corresponds to a physical

constitution of a vehicle occupant abutting against an air bag body can be generated.

[0042] The present invention discloses an air bag device according to claim 1, wherein the inner air bag body is made of a cloth material having a large number of vent holes formed therein. 5

[0043] Accordingly, there is an excellent effect in that suitable reaction force which corresponds to a physical constitution of a vehicle occupant abutting against an air bag body can be generated by a simple structure. 10

[0044] The present invention discloses an air bag device according to claim 1, wherein the inner air bag body is made of a cloth material having a high gas permeability.

[0045] Accordingly, there is an excellent effect in that suitable reaction force which corresponds to a physical constitution of a vehicle occupant abutting against an air bag body can be generated by a simple structure. 15

[0046] The present invention discloses an air bag device having an air bag body which unfolds in an interior of a vehicle, the air bag body comprising: an outer air bag body; and an inner air bag body having a capacity smaller than that of the outer air bag body and unfolding in an interior of the outer air bag body, wherein the outer air bag body includes at least one first hole formed therein, and the inner air bag body includes communication means which is formed at least on a facing surface thereof substantially facing a vehicle occupant at the time of unfolding the air bag body, the communication means being provided to allow communication between an interior of the inner air bag body and a space formed between the inner air bag body and the outer air bag body. 20 25 30

[0047] Accordingly, there is an excellent effect in that suitable reaction force which corresponds to a physical constitution of a vehicle occupant abutting against an air bag body can be generated. 35

[0048] There is provided an air bag device of the present invention which allows generation of suitable reaction force which corresponds to a physical constitution of a vehicle occupant abutting against an air bag body. In the air bag device, a region of an outer air bag body pressed by the vehicle occupant abuts an inner air bag body and closes vent holes formed in the inner air bag body. Therefore, a quantity of gas flowing from the inner air bag body into a space formed between the outer air bag body and the inner air bag body can be controlled. Accordingly, the quantity of gas flowing through the vent holes into the space and further escaping from the air bag body via vent holes formed in the outer air bag body can be adjusted in accordance with a physical constitution of the vehicle occupant abutting against the air bag body. 40 45 50

Claims

1. An air bag device having an air bag body (18) which

expands to unfold in an interior of a vehicle, said air bag body comprising:

an outer air bag (32) having vent holes (46) communicating with an exterior of said air bag body; and

an inner air bag body (34) having a capacity smaller than that of said outer air bag body and unfolding in an interior of said outer air bag body, wherein said inner air bag body is formed so as to have a high gas permeability, characterized in that when a vehicle occupant abuts against said outer air bag body (32), a portion of said outer air bag body (32) pressed by the vehicle occupant abuts said inner air bag body (34) so as to control a quantity of gas flowing from said inner air bag body into said outer air bag body.

2. An air bag device according to claim 1, wherein said inner air bag body is made of a cloth material having a large number of vent holes formed therein.
3. An air bag device according to claim 1, wherein said inner air bag body is made of a cloth material having a high gas permeability.
4. An air bag device according to claim 1, wherein said inner air bag body (34) includes communication means which is formed at least on a facing surface thereof substantially facing a vehicle occupant at the time of unfolding the air bag body, said communication means being provided to allow communication between an interior of said inner air bag body and a space formed between said inner air bag body and said outer air bag body.
5. An air bag device according to claim 4, wherein said communication means is a plurality of second holes formed in said inner air bag body.
6. An air bag device according to claim 5, wherein at the time of unfolding said air bag body, in accordance with a number of said second holes closed by said outer air bag body pressed by the vehicle occupant, a quantity of gas flowing from the interior of said inner air bag body into the space formed between said inner air bag body and said outer air bag body is adjusted.
7. An air bag device according to claim 4, wherein said communication means is a cloth member having air-permeability.
8. An air bag device according to claim 7, wherein at the time of unfolding said air bag body, in accordance with an area of said cloth member abutted by

said outer air bag body pressed by the vehicle occupant, a quantity of gas flowing from the interior of said inner air bag body into the space formed between said inner air bag body and said outer air bag body is adjusted.

9. An air bag device according to claim 4, wherein at the time of unfolding said air bag body, due to an abutting portion of said outer air bag body pressed by the vehicle occupant abutting an abutted portion of said inner air bag body abutted by said abutting portion, a portion of said communication means formed on said abutted portion becomes non-communicating state.

10. An air bag device according to claim 9, wherein due to a change of an area of said abutted portion in accordance with a physical constitution of the vehicle occupant abutting said outer air bag body, a quantity of gas flowing from the interior of said inner air bag body into the space formed between said inner air bag body and said outer air bag body is adjusted.

11. An air bag device according to claim 4, wherein the first hole allows communication between a space which is formed between said inner air bag body and said outer air bag body, and an exterior of said outer air bag body.

12. An air bag device according to claim 4, further comprising prevention means which prevents said inner air bag body from abutting the first hole formed in said outer air bag body at the time of unfolding the air bag body.

13. An air bag device according to claim 12, wherein said prevention means is formed in such a manner that one end thereof is fixed to a portion of said inner air bag body in the vicinity of the first hole at the time of unfolding said air bag body, and another end is fixed to one of an inflator for unfolding said air bag body and a portion in the vicinity of the inflator.

Patentansprüche

1. Eine Airbagvorrichtung mit einem Airbagkörper (18), der sich ausdehnt, um sich im Innenraum eines Kraftfahrzeugs zu entfalten, wobei dieser Airbagkörper folgendes umfasst: einen äußeren Airbag (32) mit Belüftungslöchern (46), die mit einem Äußeren dieses Airbagkörpers kommunizieren; und einen inneren Airbagkörper (34) der eine Kapazität hat, die kleiner als die dieses äußeren Airbagkörpers ist, und der sich in einem Inneren dieses äußeren Airbagkörpers entfaltet, wobei dieser innere Airbagkörper so gestaltet ist, dass er eine

hohe Gasdurchlässigkeit aufweist; dadurch gekennzeichnet, dass,

wenn ein Fahrzeuginsasse gegen diesen äußeren Airbagkörper (32) stößt, ein Bereich dieses äußeren Airbagkörpers (32), der durch den Fahrzeuginsassen gedrückt wird, so gegen diesen inneren Airbagkörper (34) stößt, dass eine Menge Gas kontrolliert wird, die von diesem inneren Airbagkörper in diesen äußeren Airbagkörper strömt.

2. Eine Airbagvorrichtung nach Anspruch 1; wobei dieser innere Airbagkörper aus einem Gewebematerial mit einer großen Zahl darin vorgesehener Belüftungslöcher besteht.

3. Eine Airbagvorrichtung nach Anspruch 1; wobei dieser innere Airbagkörper aus einem Gewebematerial mit einer hohen Gasdurchlässigkeit besteht.

4. Eine Airbagvorrichtung nach Anspruch 1; wobei dieser innere Airbagkörper (34) eine Kommunikationsvorrichtung enthält, die mindestens an einer gegenüberliegenden Oberfläche davon vorgesehen ist, die im Wesentlichen einem Fahrzeuginsassen zum Zeitpunkt des Entfaltens des Airbagkörpers gegenüberliegt, wobei diese Kommunikationsvorrichtung vorgesehen ist, um eine Kommunikation zwischen einem Inneren dieses inneren Airbagkörpers und einem Raum zu ermöglichen, der zwischen diesem inneren Airbagkörper und diesem äußeren Airbagkörper gebildet wird.

5. Eine Airbagvorrichtung nach Anspruch 4; wobei diese Kommunikationsvorrichtung eine Vielzahl von Sekundärlöchern ist, die in diesem inneren Airbagkörper vorgesehen ist.

6. Eine Airbagvorrichtung nach Anspruch 5; wobei zum Zeitpunkt des Entfaltens dieses Airbagkörpers entsprechend einer Anzahl dieser Sekundärlöcher, die durch diesen äußeren Airbagkörper, der vom Fahrzeuginsassen gedrückt wird, geschlossen werden, eine Menge Gas, die aus dem Inneren dieses inneren Airbagkörpers in den Raum strömt, der zwischen diesem inneren Airbagkörper und diesem äußeren Airbagkörper gebildet wird, gesteuert wird.

7. Eine Airbagvorrichtung nach Anspruch 4; wobei diese Kommunikationsvorrichtung ein Gewebeelement ist, das luftdurchlässig ist.

8. Eine Airbagvorrichtung nach Anspruch 7; wobei zum Zeitpunkt des Entfaltens dieses Airbagkörpers entsprechend einer Fläche dieses Gewebeelements, das durch diesen äußeren Airbagkörper, der vom Fahrzeuginsassen gedrückt wird, gedrückt wird, eine Menge Gas, das aus dem Inneren dieses inneren Airbagkörpers in den Raum strömt, der zwischen diesem inneren Airbagkörper und diesem äußeren Airbagkörper gebildet wird, gesteuert wird.

schen diesem inneren Airbagkörper und diesem äußeren Airbagkörper gebildet wird, gesteuert wird.

9. Eine Airbagvorrichtung nach Anspruch 4; wobei zum Zeitpunkt des Entfaltens dieses Airbagkörpers aufgrund eines gedrückten Bereichs dieses äußeren Airbagkörpers, der durch den Fahrzeuginsassen gedrückt wird, der gegen einen gedrückten Bereich dieses inneren Airbagkörpers drückt, der durch diesen gedrückten Bereich gedrückt wird, ein Bereich dieser Kommunikationsvorrichtung in diesem gedrückten Bereich in einen nicht kommunizierenden Zustand versetzt wird. 5 10
10. Eine Airbagvorrichtung nach Anspruch 9; wobei aufgrund der Änderung der Fläche dieses gedrückten Bereichs entsprechend einer physischen Konstitution des Fahrzeuginsassen, der gegen diesen äußeren Airbagkörper drückt, eine Menge Gas gesteuert wird, die aus dem Inneren dieses inneren Airbagkörpers in den Raum strömt, der zwischen diesem inneren Airbagkörper und diesem äußeren Airbagkörper gebildet wird. 15 20
11. Eine Airbagvorrichtung nach Anspruch 4; wobei das erste Loch eine Kommunikation zwischen einem Raum, der zwischen diesem inneren Airbagkörper und diesem äußeren Airbagkörper gebildet wird, und einem Äußeren dieses äußeren Airbagkörpers ermöglicht. 25 30
12. Eine Airbagvorrichtung nach Anspruch 4; die zusätzlich eine Präventionsvorrichtung umfasst, die verhindert, dass dieser innere Airbagkörper gegen das erste Loch, das in diesem äußeren Airbagkörper vorgesehen ist, zum Zeitpunkt des Entfaltens dieses Airbagkörpers drückt. 35
13. Eine Airbagvorrichtung nach Anspruch 12; wobei diese Präventionsvorrichtung derartig geformt ist, dass ein Ende davon an einem Bereich dieses inneren Airbagkörpers in der Nähe des ersten Lochs zum Zeitpunkt des Entfaltens dieses Airbagkörpers befestigt ist und ein anderes Ende davon an einem Generator zum Entfalten dieses Airbagkörpers und einem Bereich in der Nähe des Generators befestigt ist. 40 45

Revendications 50

1. Dispositif de sac de sécurité gonflable comportant un corps de sac de sécurité gonflable (18) qui se développe de manière à se déplier à l'intérieur d'un véhicule, ledit corps de sac de sécurité comprenant : 55

un sac de sécurité gonflable externe (32) ayant

des trous d'évacuation (46) communiquant avec un extérieur dudit sac de sécurité gonflable ; et

un corps de sac de sécurité gonflable interne (34) ayant une capacité plus petite que celle dudit corps de sac de sécurité gonflable externe et se dépliant à l'intérieur dudit corps de sac de sécurité gonflable externe, dans lequel ledit corps de sac de sécurité gonflable interne est formé de façon à avoir une perméabilité au gaz élevée, caractérisé en ce que lorsqu'un occupant de véhicule vient en butée contre ledit corps de sac de sécurité gonflable externe (32), une partie dudit corps de sac de sécurité gonflable externe (32) pressée par l'occupant du véhicule vient en butée sur ledit corps de sac de sécurité gonflable interne (34) de façon à commander une quantité de gaz s'écoulant depuis ledit corps de sac de sécurité gonflable interne dans ledit corps de sac de sécurité gonflable externe.

2. Dispositif de sac de sécurité gonflable selon la revendication 1, dans lequel ledit corps de sac de sécurité gonflable interne est constitué d'un matériau d'étoffe comportant un nombre important de trous d'évacuation formés dans celui-ci.
3. Dispositif de sac de sécurité gonflable selon la revendication 1, dans lequel ledit corps de sac de sécurité gonflable interne est constitué d'un matériau d'étoffe présentant une perméabilité élevée au gaz.
4. Dispositif de sac de sécurité gonflable selon la revendication 1, dans lequel ledit corps de sac de sécurité gonflable interne (34) inclut un moyen de communication qui est formé au moins sur sa surface faciale sensiblement en face d'un occupant de véhicule au moment du dépliement du corps de sac de sécurité gonflable, ledit moyen de communication étant conçu pour permettre la communication entre un intérieur dudit corps de sac de sécurité gonflable interne et un espace formé entre ledit corps de sac de sécurité gonflable interne et ledit corps de sac de sécurité gonflable externe.
5. Dispositif de sac de sécurité gonflable selon la revendication 4, dans lequel ledit moyen de communication comporte une pluralité de seconds trous formés dans ledit corps de sac de sécurité gonflable interne.
6. Dispositif de sac de sécurité gonflable selon la revendication 5, dans lequel au moment du dépliement dudit corps de sac de sécurité gonflable, en conformité avec un nombre desdits seconds trous fermés par ledit corps de sac de sécurité gonflable

externe pressé par l'occupant de véhicule, une quantité de gaz s'écoulant de l'intérieur dudit corps de sac de sécurité gonflable interne dans l'espace formé entre ledit corps de sac de sécurité gonflable interne et ledit corps de sac de sécurité gonflable externe est ajustée. 5

7. Dispositif de sac de sécurité gonflable selon la revendication 4, dans lequel ledit moyen de communication est un élément d'étoffe ayant une perméabilité à l'air. 10

8. Dispositif de sac de sécurité gonflable selon la revendication 7, dans lequel au moment du dépliement dudit corps de sac de sécurité gonflable, en conformité avec une zone dudit élément d'étoffe qui vient en butée avec ledit corps de sac de sécurité gonflable externe pressé par l'occupant du véhicule, une quantité s'écoulant de l'intérieur dudit corps de sac de sécurité gonflable interne dans l'espace formé entre ledit corps de sac de sécurité gonflable interne et ledit corps de sac de sécurité gonflable externe est ajustée. 15 20

9. Dispositif de sac de sécurité gonflable selon la revendication 4, dans lequel au moment du dépliement dudit corps de sac de sécurité gonflable, dû à une partie venant en butée dudit corps de sac de sécurité gonflable externe pressé par l'occupant du véhicule venant en butée sur une partie de butée dudit corps de sac de sécurité gonflable interne mis en butée par ladite partie de butée, une partie dudit moyen de communication formée sur ladite partie de butée devient à l'état non communicant. 25 30 35

10. Dispositif de sac de sécurité gonflable selon la revendication 9, dans lequel en raison d'un changement d'une zone de ladite partie de butée en conformité avec une constitution physique de l'occupant d'un véhicule venant en butée sur ledit corps de sac de sécurité gonflable externe, une quantité de gaz s'écoulant de l'intérieur dudit corps de sac de sécurité gonflable interne dans l'espace formé entre ledit corps de sac de sécurité gonflable interne et ledit corps de sac de sécurité gonflable externe est ajustée. 40 45

11. Dispositif de sac de sécurité gonflable selon la revendication 4, dans lequel le premier trou permet la communication entre un espace qui est formé entre ledit corps de sac de sécurité gonflable interne et ledit corps de sac de sécurité gonflable externe, et un extérieur dudit corps de sac de sécurité gonflable externe. 50 55

12. Dispositif de sac de sécurité gonflable selon la revendication 4 comprenant, en outre, un moyen de prévention qui empêche ledit corps de sac de sé-

curité gonflable interne de venir en butée sur le premier trou formé dans ledit corps de sac de sécurité gonflable externe au moment du dépliement dudit corps de sac de sécurité gonflable.

13. Dispositif de sac de sécurité gonflable selon la revendication 12, dans lequel ledit moyen de prévention est formé d'une manière telle qu'une de ses extrémités est fixée à une partie dudit corps de sac de sécurité gonflable interne au voisinage du premier trou au moment du dépliement dudit corps de sac de sécurité gonflable, et une autre extrémité fixée à un d'un dispositif du gonflage pour déplier ledit corps de sac de sécurité gonflable et une partie au voisinage du dispositif de gonflage.

FIG. 1

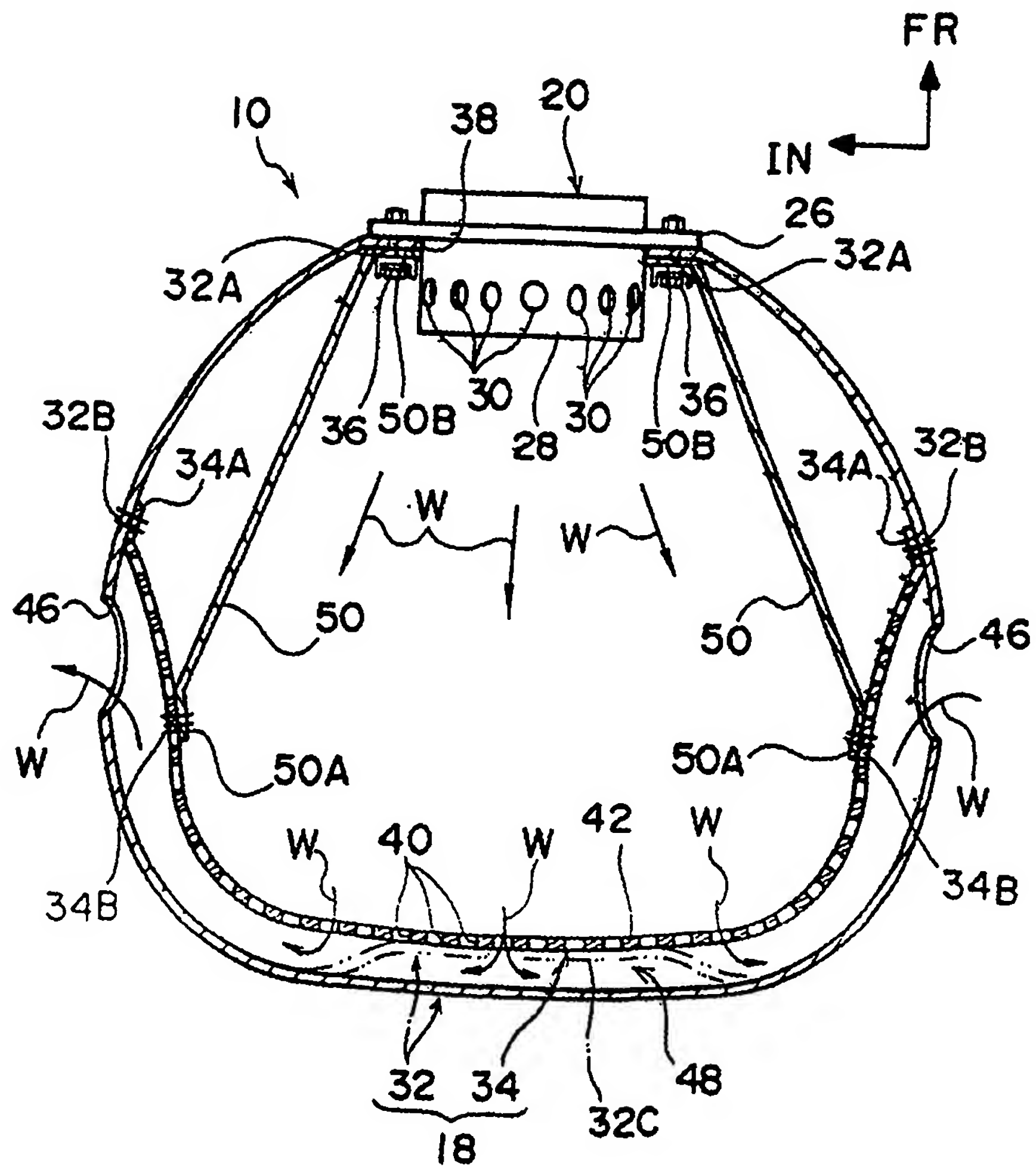


FIG. 2

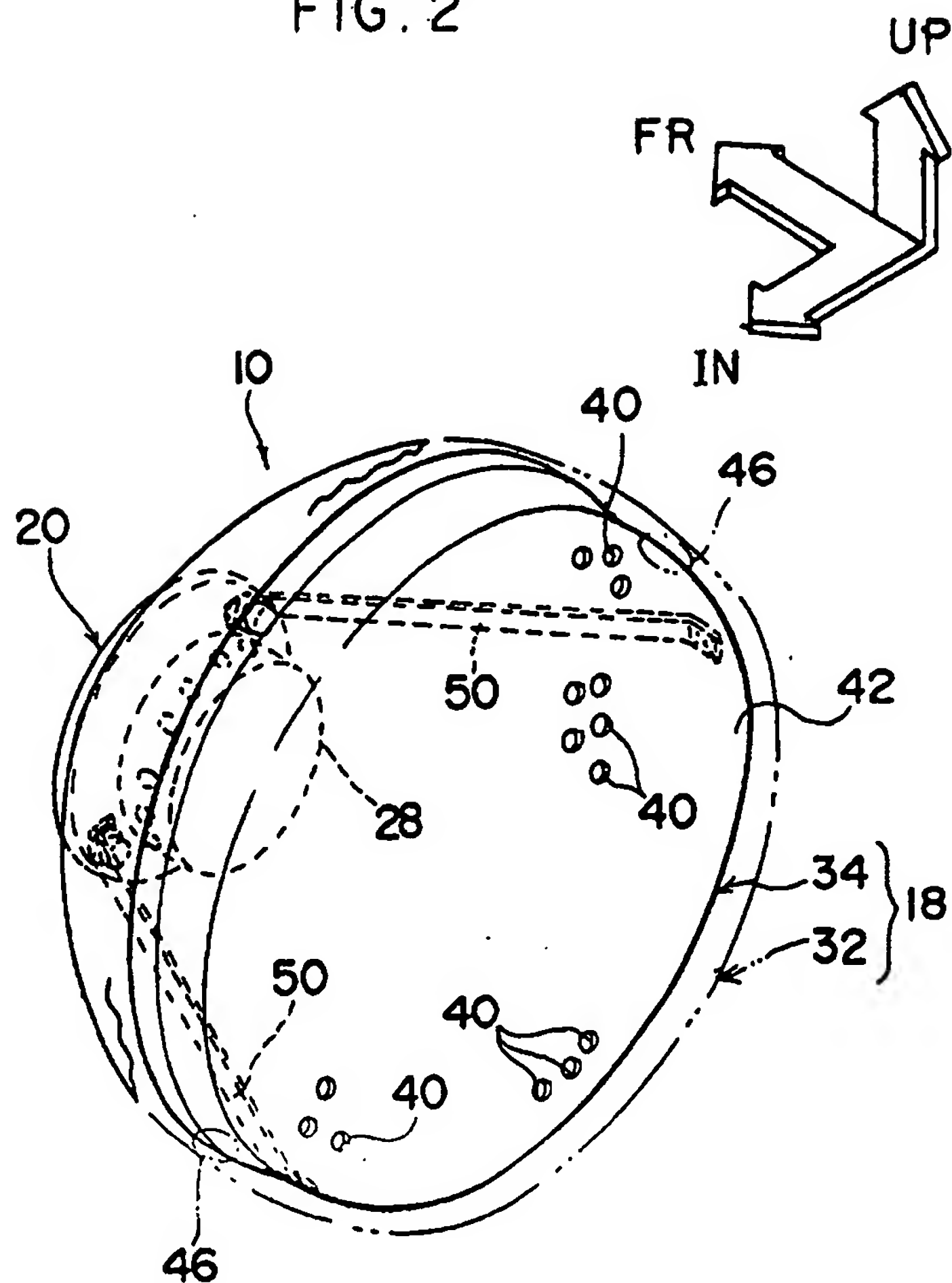


FIG. 3B

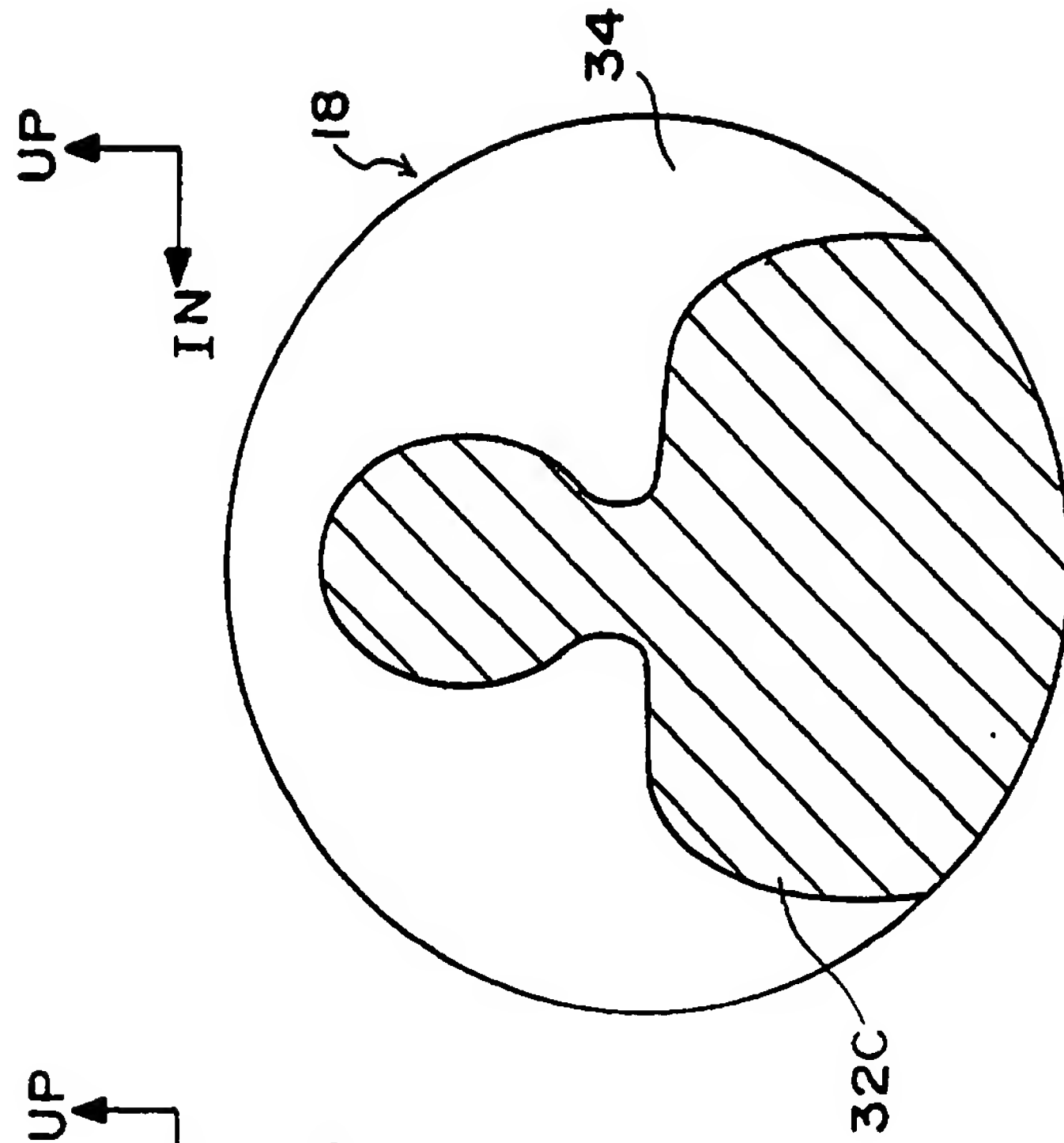
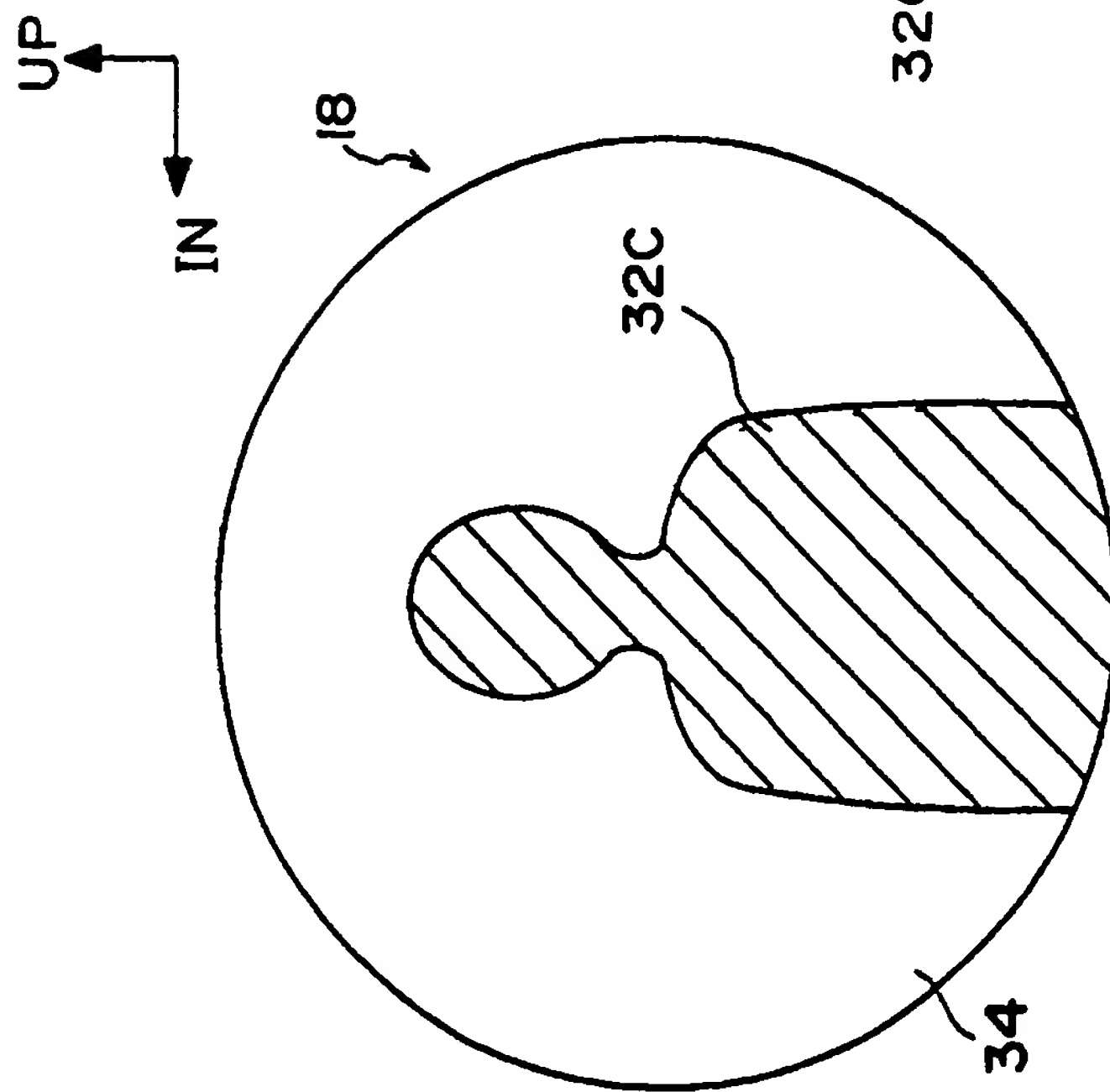


FIG. 3A



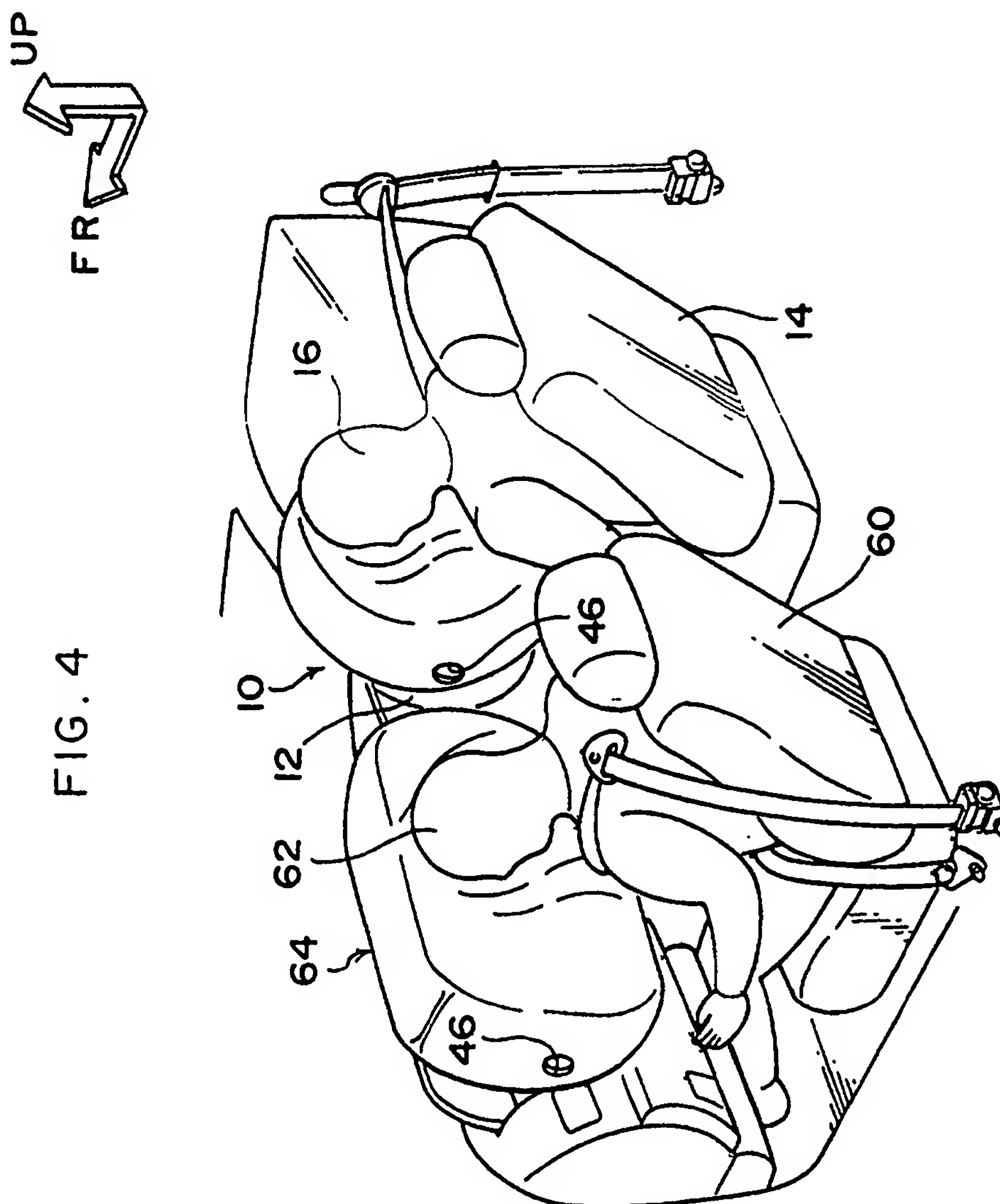


FIG. 5

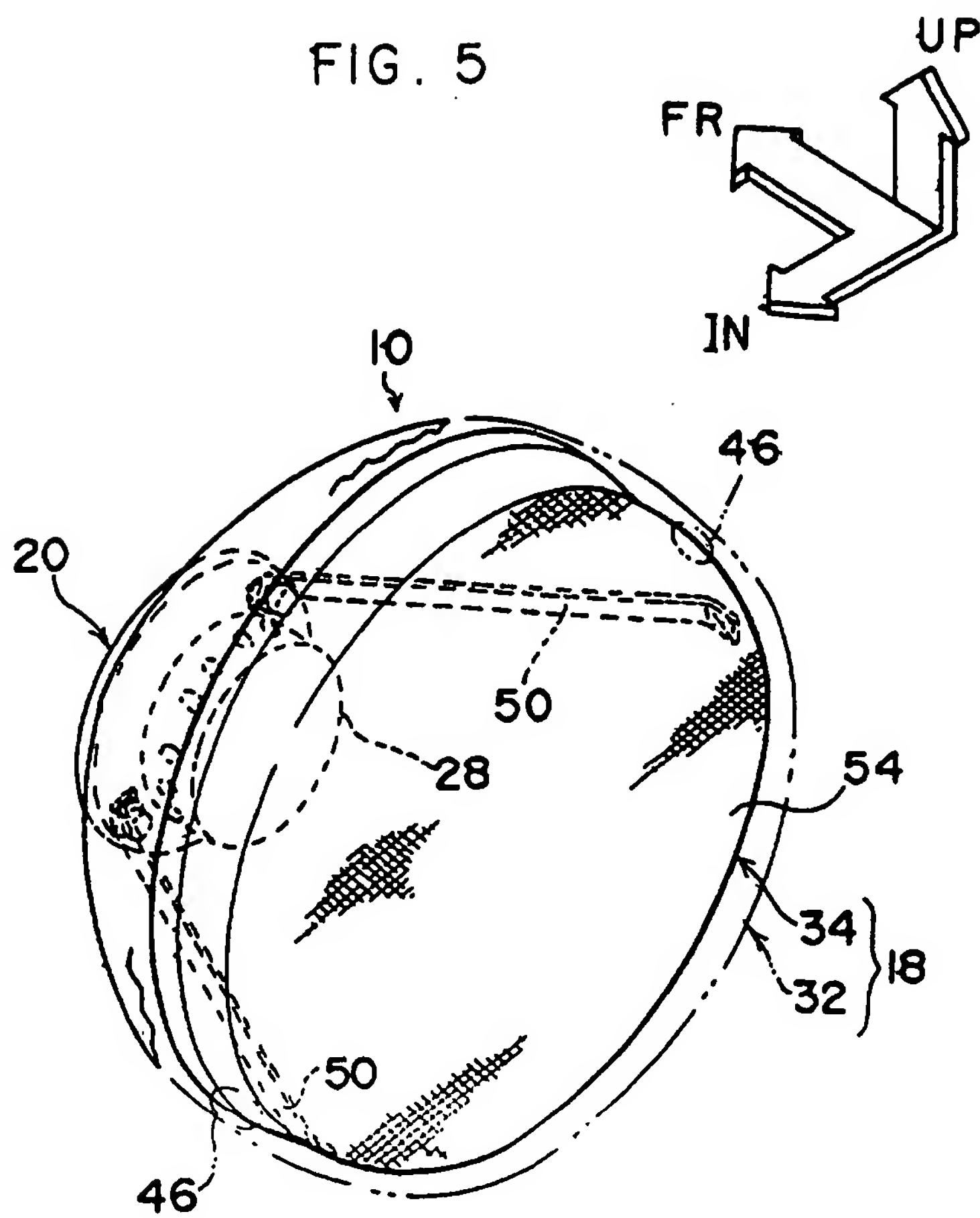


FIG. 6

